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(54) A QUICK-FITTING WALL ATTACHMENT

(71) We, SOCIETE ANONYME AUTOMOBILES CITROEN, a Company organised and existing under Articles 118 to 150 of the French Law concerning Commercial Companies, of 117 to 167, Quai André Citroën, 75747 — Paris Cedex 15, France, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a device adapted to be attached quickly to a wall, *inter alia* to guide a cable passing through the wall.

According to the invention there is provided a device adapted to be attached quickly to a wall, comprising: a cylindrical member having one end which is provided with stop means and is insertable through an aperture in the wall in a given angular orientation of the cylindrical member relative to the aperture; a sliding member mounted on the cylindrical member and rotatable relative thereto; and resilient means to thrust the sliding member against the stop means, rotation of the cylindrical member after insertion of the said one end thereof through the aperture in the wall bringing the stop means into position for axial abutment with the wall to clamp the edge of the aperture between the stop means and the sliding member under the action of the resilient means; in which device: the sliding member comprises a ring provided at its end nearest the stop means with a collar the outer radial dimension of which is greater than that of the aperture in the wall so that the collar cannot pass through the aperture; the resilient means is disposed between the said ring and a bearing element in the form of a sleeve mounted on the cylindrical member and retained axially in relation thereto; the stop means on the cylindrical member comprises at least one radially outwardly extending lug unitary with the said end of the cylindrical member and adapted to pass through a corresponding notch provided at the periphery of the aperture in the wall; and the ring has at least one boss projecting axially from the surface of the collar which faces the stop means, the cross-section of the boss being similar to that of the lug or lugs of the cylindrical member, so that the boss can be introduced into the or a notch of the aperture in the wall.

The ring preferably comprises as many bosses as the cylindrical member comprises lugs, such bosses being angularly distributed like the lugs, so that they can be introduced into the notches of the aperture in the wall.

The device is employed in association with a wall formed with an aperture having notches for the lugs at the said one end of the cylindrical member, the number of notches being equal to the number of lugs, and the notches being angularly distributed in the same way as the lugs.

Preferably the cylindrical member comprises two diametrically opposite lugs and the ring comprises two diametrically opposite bosses.

Advantageously, the resilient means comprise a helical spring disposed around the cylindrical member.

The sleeve forming a bearing element may be retained axially on the cylindrical member by a hairpin clip engaging in a peripheral groove in the cylindrical member, the hairpin clip projecting transversely to act as an axial stop for the sleeve.

A device embodying the invention is advantageously used to guide a cable, *inter alia* a bowden cable, through the wall, the cylindrical member comprising an internal cavity which extends right through the

member to provide a passage for the cable.

More particularly, when the device is for use with a bowden cable received in a flexible sheath which is adapted to withstand compressive stresses and the ends of which bear against stops in use, the internal cavity of the cylindrical member comprises a recess adapted to receive an end portion of the sheath, the recess extending to that end of the cylindrical member which is opposite the end having the stop means, the said cavity also comprising an internal shoulder marking a separation between the said recess and a chamber forming a passage for the cable, the internal shoulder forming a unilateral stop for an end of the sheath introduced into the recess, so that the cylindrical member is movable axially when the force transmitted by the cable reaches a limit determined by the resilient means of the device and the device acts to limit the force transmitted by the cable.

The device may advantageously be assembled with a motor vehicle cab wall for guiding a gas butterfly valve control cable extending from an accelerator pedal through the said wall.

In order that the invention may be readily understood, an embodiment thereof will now be described, by way of example, with reference to the accompanying drawings, in which:

FIGURE 1 shows in perspective, with parts removed, a device embodying the invention before mounting thereof on a wall;

FIGURE 2 shows, similarly to Figure 1, the device during its mounting on the wall;

FIGURE 3 shows, similarly to Figure 1, the device when mounted on the wall;

FIGURE 4 is an axial section, on an enlarged scale, through the device embodying the invention; and

FIGURE 5 illustrates diagrammatically, with parts removed, the use of the device embodying the invention with a bowden control cable.

The drawings, more particularly Figure 1, show a device 1, adapted to be attached quickly to a wall 2, *inter alia* to guide a cable through the wall.

The device 1 comprises a cylindrical member 3 having an end 4 provided with radially projecting stop means A. The stop means A comprise at least one radially orientated lug 5 unitary with the end 4 of the member 3 and projecting from the outer surface thereof. In the embodiment illustrated the member 3 comprises two diametrically opposite lugs 5.

The end 4 of the member 3 is adapted to engage in an aperture 6 in the wall 2. The shape of the aperture 6 is such that the end 4 can be introduced into the aperture when the member 3 is in a given relative angular position relative to the wall 2 and, after rotation of the member 3 relative to the wall 2, the stop means A abut the wall 2 axially, as shown in Figure 3.

More precisely, the aperture 6 has notches 7 at the edge of the aperture. The number of notches 7 is the same as the number of lugs 5 and the shape of a notch 7 is similar to that of a lug 5 — i.e., substantially rectangular in the embodiment illustrated; also in this embodiment two diametrically opposite notches 7 are provided. Of course the number of notches and lugs 5 can differ from two but the notches are separated by the same angular distances as the lugs (same angular distribution). Outside the notches 7, the edge of the aperture 6 is formed by portions of a circle dimensioned to receive the end 4 of the member 3. The aperture 6 can be made by punching. Clearly, by presenting the lugs 5 opposite the notches 7, the end 4 can be introduced through the aperture 6.

A sliding member 8 is mounted on the member 3, which it encloses. The member 8 is formed by a ring comprising, at its end facing the lugs 5, a radially extending collar 9 whose transverse dimension, i.e. the outside diameter, is greater than the transverse dimension, i.e. the diameter of the aperture 6. Except for the sliding clearance. The inside diameter of the ring 8 is equal to the outside diameter of the member 3. The lugs 5 form axial stops for the ring 8 at the end 4 of the member 3.

During the mounting of the device on the wall 2, the sliding member bears against the face of the wall opposite from that which is axially abutted by the lugs 5 (Figure 3). In the particular embodiment described, the ring 8 is mounted not only slidably, but also with provision for rotation on the member 3.

On the side of the collar 9 facing the lugs 5, the ring 8 has as many bosses 10 as there are lugs 5. The bosses 10, as shown more particularly in Figure 1, are formed by axial prominences projecting from the collar 9. The cross-section of each boss 10 is similar to and substantially identical with that of the lugs 5 and is such that the bosses 10 can be engaged in the notches 7. The angular distances between the bosses 10 are the same as those provided between the lugs 5. In the particular embodiment illustrated, two bosses 10 unitary with the collar 9 are arranged diametrically opposite one another. To enable the bosses 10 to be introduced into the notches 7, the bosses 10 are aligned with the lugs 5 (Figure 1) before insertion of end 4 into aperture 6.

The device 1 also comprises resilient

means, formed by a helical spring 11 and adapted to thrust the ring 8 against the lugs 5 (shown more particularly in Figures 1 and 4). In Figure 1, the helical spring 11 is shown with portions removed, to make the drawing easier to understand.

The end of the spring 11 remote from the ring 8 abuts a bearing element 12 formed by a sleeve mounted to slide and rotate freely on the member 3. At its end remote from the ring 8 the sleeve comprises a collar 13 having an outside diameter greater than that of the body of the sleeve 12. The spring 11 abuts the collar 13 and (Figure 1) encloses a portion of the sleeve 12. The sleeve 12 is axially retained on the member 3 by a resilient hairpin clip 14 engaging in a groove 15 in the member 3 (shown *inter alia* in Figure 4). The hairpin clip 14 comprises two arms which can be moved away from one another by the bending thereof for engagement in the groove 15. Two zones of the groove 15 are clamped by the arms of the hairpin 14, whose ends project transversely from the member 3 to act as an axial stop for the sleeve 12.

The resilient means disposed between the ring 8 and collar 13, instead of being formed by a helical spring, can be formed by a sleeve of elastomeric material or by any other equivalent means. When the device is mounted (Figure 1), the resilient means are compressed and exert at their two ends a thrust against the ring 8 and the sleeve 12 respectively. The amount of prestressing is selected in accordance with the intended application of the device 1.

The device 1 may be used to guide a cable through the wall 2. In that case the member 3 comprises an internal cavity 16 (Figure 4) which extends right through the member 3 in the longitudinal direction and receives the cable.

More particularly, the device 1 is adapted to be used as a guide for a bowden cable. The cable 17 (Figure 5) is received, except for its ends, in a flexible sheath 18 adapted to stand up to compressive forces, the two ends of the sheath 18 bearing against stops 19, 20 respectively. The ends of the cable 17 are connected at places 22 and 21 to respective members, for instance the accelerator pedal P of a vehicle, and a member to be controlled, for instance, the control lever L of the gas butterfly valve of a vehicle carburettor. The sheath 18 can be at least partly enclosed by protective sheath 23, for example of elastomeric material.

A remote-control cable and sheath arrangement of this kind of course enables a pull to be transmitted by the cable while allowing the sheath 18 to follow a curved path permitting the most satisfactory accommodation of this remote-control force-transmitting arrangement. Figure 5 is simplified, the cable 17 and sheath 18 being shown in rectilinear form, whereas in reality the portion lying between the two stops 19, 20 is sinuous. The stop 19 at one of the ends of the sheath 18 is formed by a bush with catches or screwthreading mounted on a support 24 adapted to be adjusted axially to enable the control assembly to be suitably regulated. The cable 17 extends through the bush 19 and continues on its own therebeyond as far as the member L to be controlled. The stop 20 at the other end of the sheath 18 is formed by an inside shoulder of the cavity 16 of the member 3 (Figure 4). The shoulder 20 marks the separation between a cylindrical recess 25 forming a portion of the cavity 16 and adapted to receive an end portion of the sheath 18, and a chamber 26, shown as a frusto-conical chamber, through which passes the cable 17, which continues on its own as far as the control member P. The recess 25 terminates at the end of the member 3 opposite from that having the stop means 5.

At the axial location of the shoulder 20 the chamber 26 has a section whose diameter is smaller than that of the sheath 18; the diameter of the cross-section of the chamber 26 progressively increases as distance from the shoulder 20 increases.

This being the case, the assembly of the elements forming the device 1, the mounting the device 1 on the wall 2, and the operation of the device are as follows.

As regards the mounting of the elements forming the device 1, assembly is carried out as follows: first of all the ring 8 is so engaged on the member 3 that the bosses 10 come into contact and are aligned with the lugs 5 at the end 4 of the member 3. Then the helical spring 11 is engaged on the member 3 so that one of the ends of the spring bears against the collar 9 of the ring 8. The sleeve 12 is next engaged on the member 3 so that the collar 13 bears against the other end of the spring 11. The resulting assembly is compressed, by pressing the sleeve 12 towards the ring 8, to stress the spring 11 and provide free access to the peripheral groove 15; the sleeve 12 is then on the same side of the groove 15 as the ring 8. The assembly is then locked by engaging the hairpin clip 14 in the groove 15. The device 1 thus assembled is ready for use.

The device 1 is mounted on the wall 2 as follows: the end 4 is inserted into the aperture 6, the relative angular position of the member 3 in relation to the wall 2 being such that the lugs 5 pass through the notches 7. Since the bosses 10 are aligned with the lugs 5 and are adapted to penetrate

into the notches 7, the insertion of the end 4 into the aperture 6 can continue until the collar 9 abuts the wall.

The intermediate position then occupied by the device 1 is shown in solid lines in Figure 2. Figure 2 shows how the bosses 10 project beyond the surface of the wall 2 opposite the surface against which the collar 9 bears. Continued thrust exerted on the member 3 in the direction applying the collar 9 against the wall 2 enables the member 3 to advance further by compression of the resilient means 11 between the collar 13 of the sleeve 12, which follows the axial movement of the member 3, and the collar 9 of the ring 8 immobilised against the wall 2.

The result is an axial disengagement of the lugs 5 in relation to the bosses 10 which are immobilised axially with the ring 8. As a result, the reaction pressures between the surfaces of the lugs 5 and bosses 10 which were previously in contact are removed. The member 3 can then readily be given a rotary movement, for instance, in the direction indicated by the arrow F in Figure 2. The end 4 and the lugs 5 rotate with the member 3 to occupy the positions shown in chain-dot lines in Figure 2, positions in which the lugs 5 are no longer aligned with the bosses 10, and are completely disengaged therefrom. As soon as axial thrust is removed from the member 3, the spring 11 displaces the sleeve 12, returning of the member 3 to the rear in relation to the ring 8. The lugs 5 then bear against the wall 2 (Figure 3). The lugs 5 can be disposed at right angles in relation to the bosses 10. The immobilisation in rotation of the ring 8 during the rotary movement of the member 3 is ensured by co-operation between the bosses 10 and the notches 7. The device 1 is thus firmly attached to the wall 2.

Clearly, the device 1 can be mounted on the wall 2 extremely quickly, without the use of tools. During demounting the operations are performed in the reverse order. Moreover, when the device 1 is used to guide a bowden cable, the device 1 enables the axial force transmitted by the cable to be limited since when a force is transmitted by the cable 17 (Figure 5), the sheath 18 exerts at its two ends a thrust on the stops 19, 20. The magnitude of the thrust increases with the magnitude of the force transmitted by the cable 17.

As shown in Figure 5, the thrust exerted by the sheath 18 on the shoulder 20 is transmitted to the member 3 and, via the hairpin clip 14 and sleeve 12, the thrust acts against the spring 11 whose end remote from the sleeve 12 bears against the ring 8 abutting the wall 2. The, thrust of the sheath 18, due to the pull of the cable 17, therefore tends to compress the spring 11. From a certain threshold onwards, which is a function of the prestressing of the spring 11, the thrust of the sheath 18 will cause a movement of the member 3 and the washer 12 in the direction bringing the sleeve 12 closer to the ring 8. During this movement the lugs 5 will be disengaged from the wall 2. Under these conditions, even if the travel of the control member P pulling on the cable 17 continues, control is performed under a force substantially stabilised and determined by the initial compression of the spring 11.

A device of this kind is particularly advantageous when a controlled member, for instance, the control lever of the gas butterfly valve of the carburettor, reaches the end of its travel before the control member, for instance the accelerator pedal, has itself reached the end of its travel. The control member will be able to continue its travel as far as the end position, while the controlled member is already at the end of its movement, without the force transmitted by the cable 17 to the control member exceeding the limit determined by the spring 11.

In the advantageous application described with reference to Figure 5, therefore, the spring 11 performs two functions: on the one hand the attachment of the device 1 to the wall 2, by clamping the wall between the lugs 5 and the collar 9, and on the other hand, a limitation of the axial force exerted by a rigid or flexible remote control. The member 3, the ring 8 and the sleeve 12 can be made of plastics material.

Clearly, the device according to the invention can be used in many applications requiring attachment to a wall.

WHAT WE CLAIM IS:—

1. A device adapted to be attached quickly to a wall, comprising: a cylindrical member having one end which is provided with stop means and is insertable through an aperture in the wall in a given angular orientation of the cylindrical member relative to the aperture; a sliding member mounted on the cylindrical member and rotatable relative thereto; and resilient means to thrust the sliding member against the stop means, rotation of the cylindrical member after insertion of the said one end thereof through the aperture in the wall bringing the stop means into position for axial abutment with the wall to clamp the edge of the aperture between the stop means and the sliding member under the action of the resilient means; in which device: the sliding member comprises a ring provided at its end nearest the stop means with a collar the outer radial dimension of which is greater than that of the aperture in the wall so that the collar cannot pass

through the aperture; the resilient means is disposed between the said ring and a bearing element in the form of a sleeve mounted on the cylindrical member and retained axially in relation thereto; the stop means on the cylindrical member comprises at least one radially outwardly extending lug unitary with the said end of the cylindrical member and adapted to pass through a corresponding notch provided at the periphery of the aperture in the wall; and the ring has at least one boss projecting axially from the surface of the collar which faces the stop means, the cross-section of the boss being similar to that of the lug or lugs of the cylindrical member, so that the boss can be introduced into the or a notch of the aperture in the wall.

2. A device according to Claim 1, wherein the ring comprises as many bosses as the cylindrical member comprises lugs, such bosses being angularly distributed like the lugs, so that they can be introduced into the notches of the aperture in the wall.

3. A device according to Claim 2, associated with the wall formed with the aperture having notches for the lugs at the said one end of the cylindrical member, wherein the number of notches is equal to the number of lugs, the notches being angularly distributed in the same way as the lugs.

4. A device according to Claim 2 or 3, wherein the cylindrical member comprises two diametrically opposite lugs and the ring comprises two diametrically opposite bosses.

5. A device according to any preceding claim, wherein the resilient means comprise a helical spring disposed around the cylindrical member.

6. A device according to any preceding claim, wherein the sleeve forming the bearing element is retained axially on the cylindrical member by a hairpin clip engaging in a peripheral groove in the cylindrical member, the hairpin clip projecting transversely to act as an axial stop for the sleeve.

7. A device according to any preceding claim, wherein the cylindrical member comprises an internal cavity which extends right through the member to provide a passage for the cable.

8. A device according to Claim 7, for use with a Bowden cable received in a flexible sheath which is adapted to withstand compressive forces and the ends of which bear against stops in use, in which device the internal cavity of the cylindrical member comprises a recess adapted to receive and end portion of the sheath, the recess extending to that end of the cylindrical member which is opposite the end having the stop means, the said cavity also comprising an internal shoulder marking a separation between the said recess and a chamber forming a passage for the cable, the internal shoulder forming a unilateral stop for an end of the sheath introduced into the recess, so that the cylindrical member is movable axially when the force transmitted by the cable reaches a limit determined by the resilient means of the device and the device acts to limit the force transmittd by the cable.

9. A device according to Claim 9 assembled with a motor vehicle cab wall for guiding a gas butterfly valve control cable extending from an accelerator pedal through the said wall.

10. A device according to Claim 10, substantially as hereinbefore described with reference to Figures 1 to 4 of the accompanying drawings.

11. An assembly according to Claim 10, substantially as hereinbefore described with reference to Figure 5 of the accompanying drawings.

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1 509 287 COMPLETE SPECIFICATION
2 SHEETS

This drawing is a reproduction of the Original on a reduced scale.
SHEET 1

Fig. 1

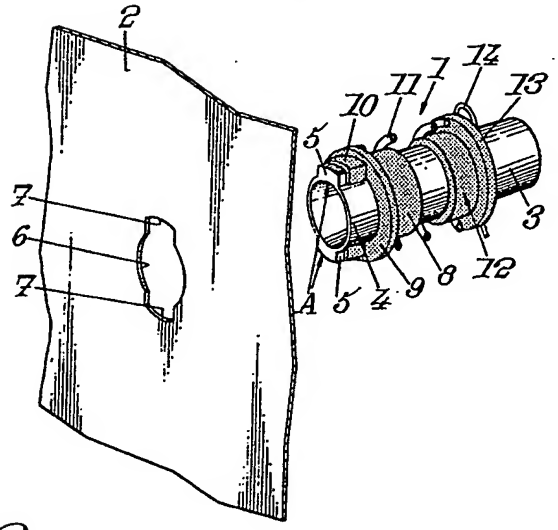


Fig. 2.

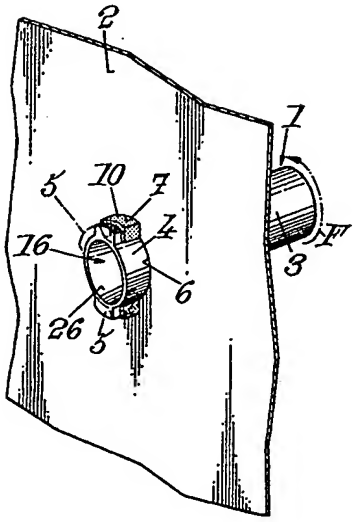
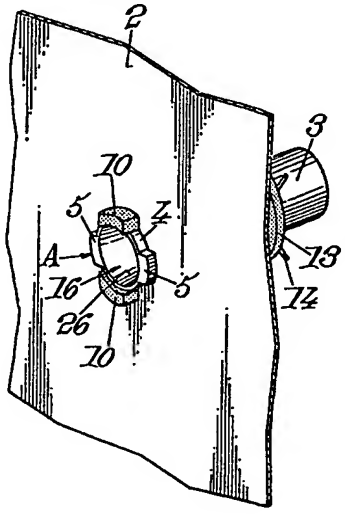


Fig. 3.



1 509 287 COMPLETE SPECIFICATION
2 SHEETS

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SHEET 2

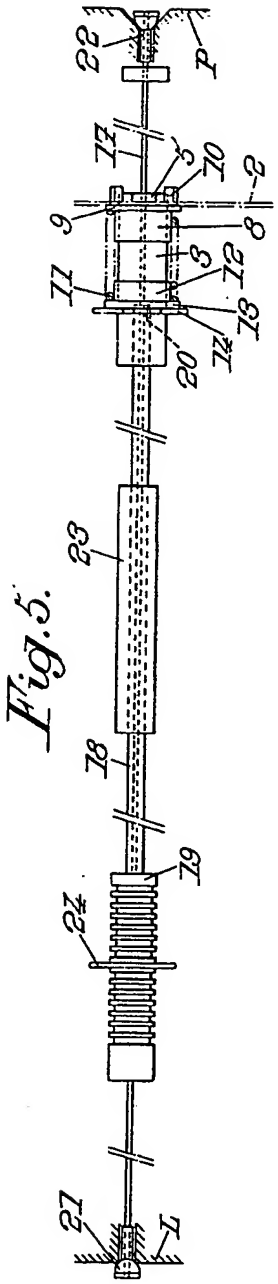

Fig. 5.

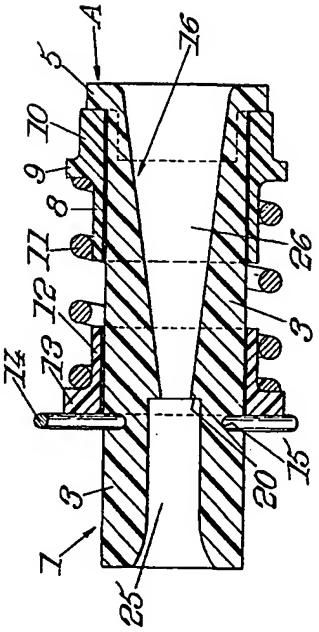

Fig. 4.